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GUS-0252
Copy 4 of 4

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10 May 1959

MEMORANDUM FOR: [redacted] R&D Officer, Development Projects Division

VIA : Acting Chief, Development Projects Division
Chief, Development Branch, Development Projects Division

SUBJECT : P&E Shell-Schmidt Proposal

1. I am returning herewith the P&E evaluation of the above proposal. I have to confess that I am both disappointed and somewhat mystified by it. The part of this evaluation I can most understand is the information contained in figure 4 which gives the ground resolution of several cameras under several alternative weather conditions. I was most surprised on studying this figure to see that the 17.5" fluggo system would apparently give notably better resolution than a 24" Shell-Schmidt system built along the lines suggested by Jim Baker. I am, of course, wholly innocent of any knowledge of optics but I had always understood that, in comparing two cameras, given the distance from the target and the same freedom of choice of emulsions, the one with longer focal length would give the better resolution.

2. What is most disappointing to me is the comparison of either of these with the present B Configuration at the U-2 altitude. Unless I completely misread figure 4, it contains an admission that an optimum system originally proposed by P&E has poorer resolution at 90,000 feet than the B camera at 70,000 feet. And it reveals that the Baker proposal modified to 24" focal length would be able to resolve an object only slightly twice as large as the P&E proposed fluggo system under given conditions of weather.

3. My failure to understand the reason for this disappointing expected performance can best be made clear by referring to the curve drawn in in red ink to show the performance of the present B Configuration in a GUSTO aircraft. This curve suggests to me that by increasing the altitude of the camera from 70,000 to 90,000 feet, the resolution is degraded 100%, that is, for any given weather condition at any given object modulation the B camera at the higher altitude could resolve an object only twice as large as at the lower altitude. I must confess I wholly fail to understand why an increase in the distance of the camera from the target of less than 30% should give rise to a 100% degradation in resolution.

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4. Translating this concern of mine over to the proposed new camera, I would state the problem as follows. We are proposing in the GUSTO aircraft the above-referred to increase of under 30% in the distance between the camera and an object lying vertically under it. At the same time, however, we are proposing at least to double resolution on the film measured in lines per millimeter. If these were the only changes we should be able actually to improve resolution on the ground. In fact, however, it appears that we will have to go to a shorter focal length. Even so, I am surprised that at 24" we could not come close to present performance. Should it be possible for us in fact to find room for a 36" focal length camera, the improvement in resolution on the film should far more than cancel out the increased distance and permit significantly better resolution than we obtain from the B camera.

5. Although the foregoing may be interesting mainly as a revelation of my own ignorance, it does state a problem, the importance of which I can hardly overemphasize. I gravely question whether we should go ahead with GUSTO at all unless someone can design a camera which will give us at the very minimum as good resolution as we now obtain with the B. In fact I believe our sights should be set much higher and that we should expect improved resolution on the film more than to offset greater altitude. Accordingly since the basic decision to proceed with GUSTO may depend on the degree of promise of the camera design, I believe we should schedule a meeting with Rod Scott and if at all possible Jim Baker, prior to 9 June so that I can enter our 9 June meeting with a better understanding of this aspect of the problem.

Attachment:
Gus-0253 (Cys 1&2)
w/att GUS-0251 Cy 1

RICHARD M. BISSELL, JR.
Deputy Director
(Plans)

cc: AC/DPD #2
C/Development Br/DPD #2

DD/P:RMB:djm
4-DD/P Chrono

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